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April 30, 2019

VIA ECFS

Ms. Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington DC 20554

Re: Docket Nos. 14-166, 14-165 *Promoting  
Spectrum Access for Wireless Microphone Operation*, et al.

Docket No. 16-185, *International Bureau Seeks Comment on  
Recommendations Approved by World Radiocommunications Conference  
Advisory Committee*

**Notice of *Ex Parte* Communications**

Dear Ms. Dortch:

On behalf of Sennheiser Electronic Corporation, and pursuant to Section 1.1206(b)(2) of the Commission's Rules, I am electronically filing this notice of oral *ex parte* communications in the above-referenced dockets.

On April 29, 2019, Joe Ciaudelli, Director of U.S. Spectrum Affairs of Sennheiser Electronic Corporation, and I, met with Aaron Goldberger of Chairman Pai's office, and Umair Javed of Commissioner Rosenworcel's office. In each case we distributed and presented the information and positions in the attached slide deck and the attached draft World Radiocommunication Conference Resolution.

Ms. Marlene H. Dortch, Secretary

April 30, 2019

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Please do not hesitate to contact me with any questions.

Respectfully submitted,

*Paul J. Feldman*

Counsel for  
Sennheiser Electronic Corporation

cc: Aaron Goldberger  
Umair Javed



# Future WRC Agenda Item: Harmonization of Frequency Bands for ENG (PMSE) Operations & other important issues for the content creation industry

JOE CIAUDELLI

DIRECTOR, SPECTRUM AFFAIRS

2019



SENNHEISER



# Sennheiser at a Glance



Global Headquarters

- ▶ Founded in 1945
- ▶ Workforce of more than 2000 people all over the world
- ▶ Annual sales approx. \$800 million
- ▶ Production sites in Germany, Ireland and the USA
- ▶ International network of subsidiaries and distribution partners

## ▶ Three U.S. Facilities:

- ▶ Old Lyme, CT: Sales & Marketing
- ▶ San Francisco, CA: Advanced R&D
- ▶ Albuquerque, NM: Factory
  - ▶ Primary plant for production of wireless microphones for Americas, Asia. Australia/ NZ



2 Factory in Albuquerque, NM USA

# Awards

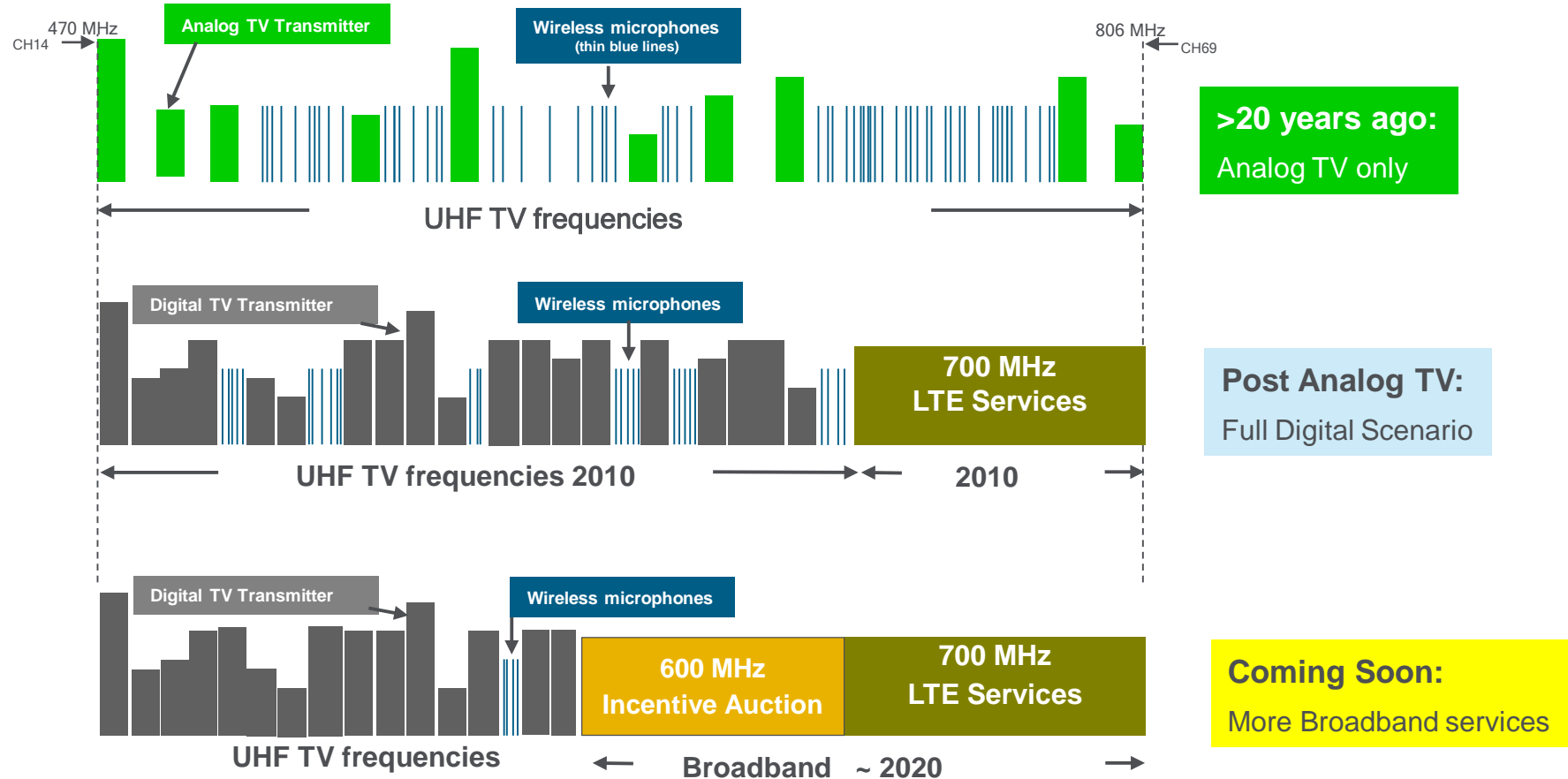


- ▶ Emmy Award
- ▶ Technical Grammy
- ▶ Academy Award

Sennheiser is the leading manufacturer in high end profesional wireless mics. More than 90% of mics used on Broadway are Sennheiser



# Repurposing of UHF TV Band Spectrum Has Severely Impacted Wireless Microphones



TV White Space Channel Evolution



# Economics: Content Creation vs. Distribution



- ▶ Spectrum is essential for content creation
- ▶ U.S. produced news and entertainment is the best in the world and vital to our economy:
  - ▶ Contributes \$1.3 Trillion to the economy = 6.85% of the national GDP
  - ▶ 3-to-1 export-to-import ratio: the highest, by far, of any American made product or service



- ▶ Demand for content and wireless microphones is robust
- ▶ Productions continue to become more sophisticated

# Essential Tools – Some Are Mission Critical



- ▶ Wireless microphones take many forms: handhelds, bodypack lapel mics, in-ear monitors, interruptible fold back (IFB) – cueing for on-air talent, intercom systems for backstage communications, coaching staff and crew in sporting events
- ▶ Networks and content creators routinely use 10 or more UHF channels for each of their daily productions
- ▶ Over 1600 coordinated frequencies (including lapel mics, intercoms, etc.) are used for Broadway theaters each night
- ▶ Major events often use hundreds
- ▶ Over 1500 frequencies are coordinated and used for the Super Bowl
- ▶ Indispensable front end of the broadcast chain when reporting life critical information during major disasters





# The Commission Should Support Harmonization



- ▶ Repurposing of the 700 MHz and now 600 MHz bands have caused disruptions in the content creation industries
- ▶ The FCC opened alternate bands for wireless microphone use (GN Docket No. 14-166)
- ▶ It is in the United States' interest for other countries to permit the same bands as they make a similar transition
- ▶ The World Radio Conference (WRC) is the appropriate forum to promote harmonization

# Alternative Bands



## ▶ 169 - 172 MHz

- (just below high band VHF TV channels) rules were revised to make it more practical for wireless mics. Licensed operation under FCC Part 90

## ▶ Additional frequency ranges above the TV Bands are now available to licensed wireless microphone operators:

### – 941.5 - 960 MHz

- Now open to all part 74 licensees (941.5 – 944 for fixed locations)
- **CANADA:** 941.5-952/ 953-960 MHz now permitted=largely HARMONIZED w/ USA! 🇺🇸 👍 🇨🇦 👍

### – 1435 - 1525 MHz – shared with flight training

- Requires approval from AFTRCC (coordinating agency for this range).

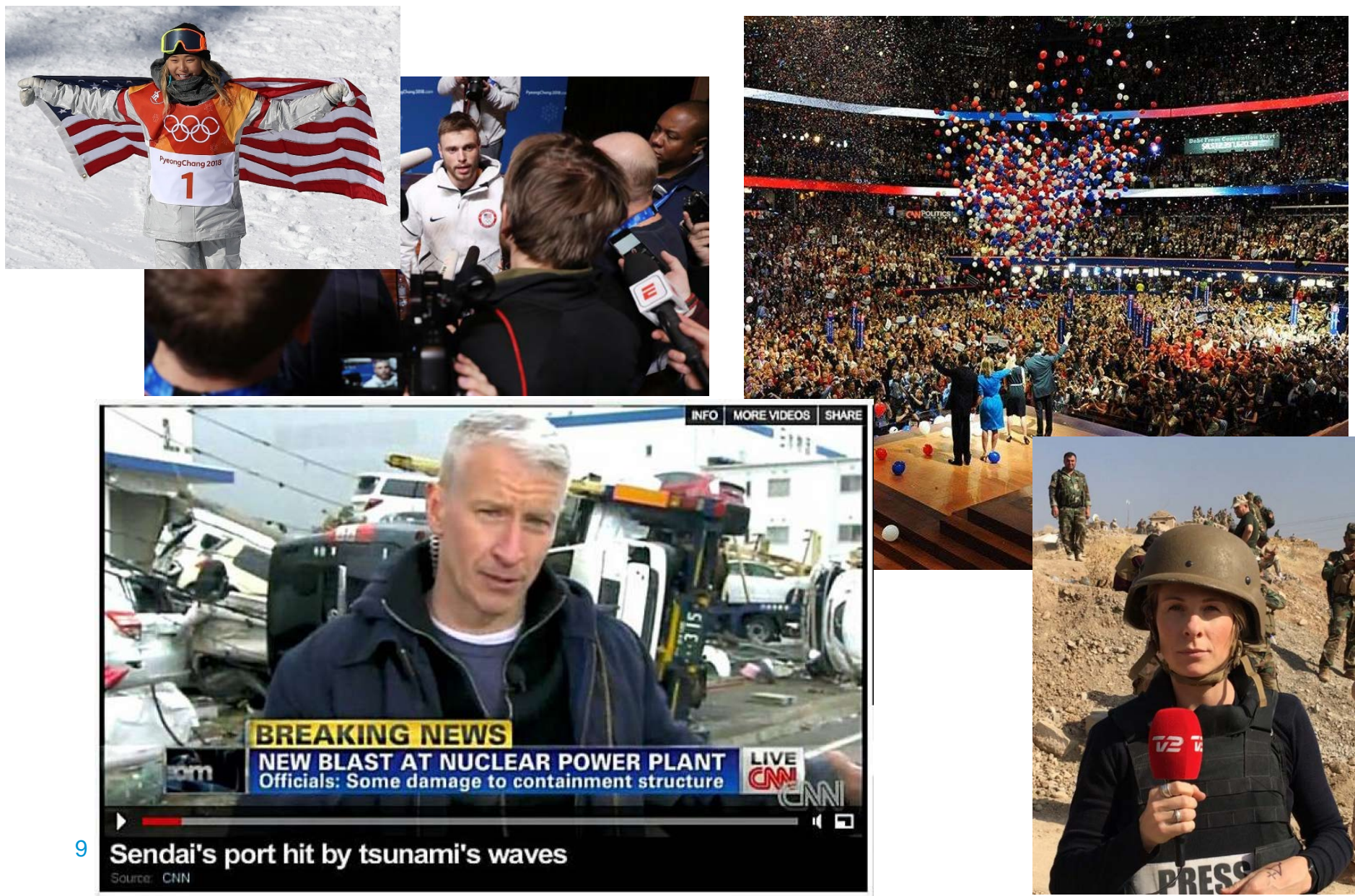
## ▶ Several European Countries (undergoing 700 MHz transition):

- 1518 – 1525 MHz 🇪🇺 👍 (potential partial harmonization)
- 1350 – 1400 MHz

## ▶ United Kingdom (undergoing 700 MHz transition):

- 960 – 1164 MHz (opened December 2018)

# Harmonization Makes Sense!





# ITU World Radio Conference (WRC)

- A future agenda item is needed for WRC 2023
  - Agenda items for future conferences will be determined at WRC 2019 this November





# Request to FCC



- ▶ We are asking the Commission to endorse and promote an agenda item for WRC-23 to harmonize frequency bands for ENG
  - WAC document 85 (IB Docket 16-185)
  - Other pending issues...

# Reserve Channel NPRM



- ▶ **The Commission should adopt its Notice of Proposed Rulemaking to reserve one UHF TV channel for wireless microphone use**
    - ▶ Shared with white space devices with priority for licensed mic operators via registration for interference protection in the database system
- 
- ▶ **The forthcoming 600 MHz mid-band gap and guard bands do not fill the reliability criteria for hypercritical mics due to:**
    - ▶ High noise floor and/ or spurious emissions from adjacent services
    - ▶ The low 20 mW output power limit when operating in these buffer zones
  - ▶ **Simulcasting in vacant channels is not needed for successful introduction of ATSC-3.0**

# FCC Approved Database System Has Collapsed



- ▶ All five TV white space databases are currently off-line!
- ▶ This system was envisioned by the Commission as the primary tool for wireless microphone operators to check for local channel availability.
- ▶ FCC TV query database has not been updated since the transition began.
- ▶ Licensing & Management Radius Search does not provide the same information.

**Crystal Cathedral**  
Garden Grove, CA



# Licensing



- ▶ Sennheiser supports the Commission's proposal to expand Part 74 license eligibility to include legitimate professional productions that do not routinely use 50+ wireless microphones
- ▶ We support the proposed language because it provides flexibility to accommodate the evolution of content creation and the performing arts
- ▶ Commission should simplify licensing process
- ▶ Part 90 licensing for 169-172 MHz
- ▶ Should be easy for intended users: schools, houses-of-worship, local government agencies, commercial entities
- ▶ Should be included automatically with an approved Part 74 license



This should be easy



# ► Thank you!



Contact:

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Paul Feldman | 703-812-0403 | [feldman@fhhlaw.com](mailto:feldman@fhhlaw.com)

## UNITED STATES OF AMERICA

### DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

#### Agenda item 10

10 *to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,*

#### **Background Information:**

Administrations are re-allocating spectrum away from Electronic News Gathering (ENG), also known as Services Ancillary to Broadcast and Program Making (SAP/SAB) and Programme Making & Special Events (PMSE), to accommodate wireless technologies, such as International Mobile Telecommunications (IMT). Some of this re-purposed spectrum is in the 600 MHz and 700 MHz bands which are heavily used by ENG. There is a general incompatibility in co-channel spectrum sharing between IMT and wireless ENG tools, particularly wireless microphones (where the definition of wireless microphones includes a wide variety of production tools such as intercom systems, in-ear monitors, and interruptible fold-back systems). For example, in the United States the repurposing of the 700 MHz band in 2010, and 600 MHz band currently in transition, not only has and will reduce TV broadcast spectrum, but will also displace a large portion of ENG operations. Other countries are now, or soon will be, undergoing a similar process. This re-purposing of spectrum from traditional TV broadcast to mobile broadband is an issue of the *distribution* of content. ENG fuels the *creation* of content and live event programs.

Demand for news and entertainment content has never been more robust, and is accelerating. Wireless microphones are used in the creation of virtually all content today, regardless of how that content is consumed: through TV, radio, laptop, tablet, cell phone, or in person. Furthermore, productions are increasingly more sophisticated, requiring more audio channels, many of them with high definition resolution. This long-term trend is clear and will inevitably continue. Worldwide, virtually all professional wireless microphones currently operate in the UHF TV band because this spectrum fulfills the requirements of demanding microphone applications, but will need alternative spectrum because of declining available of UHF TV spectrum in the 600 and 700 MHz bands, and increasing demand for content. Some administrations, including the United States, have recognized the importance and ubiquitous nature of wireless microphones and are attempting to accommodate the strong demand for news and content creation by permitting wireless microphones to also operate in alternative bands, outside TV spectrum, that are suitable for ENG applications, including 169-172 MHz and 941.5-960 MHz. As other administrations also transition from analogue TV to digital TV and mobile broadband, it is in the interests of administrations and industry to study and harmonize frequency bands and tuning ranges, as intended by Resolution ITU-R 59-1. Harmonization would provide economies of scale and logistical practicality, especially for networks and production companies

that must cover events in multiple countries, such as global news, elections, international sport events, conferences, and concert tours. ENG crews also provide early and essential disaster alert information.

**Proposal:**

**SUP**      **USA/10(XXX)/1**

**RESOLUTION 810 (WRC-15)**

**Preliminary agenda for the 2023 World Radiocommunication Conference**

The World Radiocommunication Conference (Geneva, 2015),

**Reasons:** This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

**ADD**      **USA/10(XXX)/2**

**DRAFT NEW RESOLUTION [USA-2023]**

**Agenda for the 2023 World Radiocommunication Conference**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;

b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

*resolves*

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/XX] (WRC-19), appropriate regulatory actions, *Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 MHz to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering systems;*

## 1. ENG

*resolves further*

to activate the Conference Preparatory Meeting,

*invites the Council*

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

*instructs the Director of the Radiocommunication Bureau*

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

*instructs the Secretary-General*

to communicate this Resolution to international and regional organizations concerned.

**Reasons:** Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands that are suitable for ENG, i.e. between 150 to 2 000 MHz.

**ADD USA/10(XXX)/3**

**DRAFT NEW RESOLUTION [USA/10/XX] (WRC-19)**

RESOLUTION [xxx]

*Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering<sup>1</sup> systems*

The World Radiocommunication Conference (Sharm El Sheikh, 2019),

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<sup>1</sup> For the purpose of this Resolution, ENG represents all audio applications ancillary to broadcasting and programme making (SAB/SAP), such as electronic news gathering, electronic field production, TV outside broadcast, Program Making and Special Events (PMSE), wireless radio microphones and radio outside production and broadcast.



*Considering*

- a) A large portion of ENG production tools, such as radio microphones, operate in vacant channels (6 MHz or 8 MHz wide) within the 600 MHz and 700 MHz bands;
- b) that parts of these bands are being repurposed by many administrations from terrestrial TV to mobile broadband, resulting in loss of availability of many channels for ENG operations, approximately 60 MHz at typical locations;
- c) that the technical nature of most ENG tools results in a general incapability in co-channel spectrum sharing with mobile handsets;
- d) that administrations will have to transition a large portion of ENG operations to alternate suitable spectrum, outside the 600 and 700 MHz bands;
- e) that WRC-15 initiated studies concerned with spectrum usage and operational characteristics of portable and nomadic links for terrestrial ENG systems operation in spectrum already allocated for that purpose on a global basis, in accordance with Resolution 59-1;
- e) that modularization and miniaturization of terrestrial ENG systems has increased the portability for these systems and has thus increased the trend towards cross-border operation of ENG equipment;
- d) that the technical characteristics for television outside broadcast, ENG and electronic field production systems have been established in ITU-R Recommendations (e.g. ITU-R BT 1871),

*noting*

- a) that studies undertaken by ITU-R indicate that national spectrum management could benefit from globally harmonized band planning for ENG systems;
- b) that ENG-related studies in ITU-R are based on data for current and anticipated ENG spectrum requirements collected from many administrations in all regions;
- c) that the lower frequency spectrum, i.e. less than 2 000 MHz tends to provide better propagation characteristics over obstructed paths, thereby increasing the reliability of ENG links operating in these bands;
- d) that the demand for ENG content is robust and accelerating,

*recognizing*

- a) that the production of ENG content continues to become increasingly sophisticated, requiring more channel in higher audio and video resolution formats;

- b) that the dynamic nature of the use of ENG is driven in part by unscheduled and unpredictable events such as breaking news, emergencies and disasters;
- c) that news gathering and electronic production typically takes place in an environment where several television broadcasters/organizations/networks attempt to cover the same event, creating a demand for multiple ENG links and increased demand for access to spectrum in suitable frequency bands;
- d) that handheld and body pack transmitters as well as body worn receivers require compact size, battery operation, sufficient range and small, yet efficient antennas, frequency bands suitable for mobile audio ENG are primarily within the frequency bands of 150 MHz to 2 000 MHz;
- e) There is a general incompatibility in co-channel spectrum sharing between wireless ENG / PMSE tools and some services that operate in portions of the 150 MHz to 2 000 MHz range. These include IMT; aviation radio services and aeronautical mobile telemetry (AMT)<sup>2</sup>; Radio Navigation Satellite Service (e.g., GPS); and other satellite downlink bands. Thus, for purposes of global harmonization, the identification of suitable bands will require careful consideration and detailed compatibility studies to ensure protection of these services.
- f) some administrations have already identified such alternate, suitable spectrum between 150 MHz to 2 000 MHz for ENG (e.g. 941.5 - 960 MHz, 169 - 172 MHz in the United States; 960 - 1 164 MHz in the United Kingdom; 1 350 – 1 400 MHz in portions of Region 1);
- g) Mobile ENG audio tools (i.e. wireless microphones) are low power devices, typically operating with transmitter output power of 50 mW – 250 mW, and have proven to pose a negligible risk of interference to services operating in adjacent channels (e.g. broadcast services);
- h) that access to globally harmonized spectrum is highly desirable to facilitate the rapid and less restricted deployment and operation of ENG systems from one country to another,

*resolves*

1 that, based on studies undertaken by ITU-R, WRC-23 should address the feasibility of achieving a coordinated transition for ENG operations from the 600 MHz and 700 MHz bands to suitable alternate spectrum between 150 – 2 000 MHz. The amount of alternate spectrum should total approximately 72 MHz, contiguous or separate multiple 6 MHz or 8 MHz channels, to compensate for the loss within the 600 MHz and 700 MHz bands and to accommodate the robust demand for content creation. A portion of this alternate spectrum should be identified in a

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<sup>2</sup> Notwithstanding the “general incompatibility” of wireless microphone co-channel sharing with AMT, the United States administration has allocated spectrum from 1435 - 1525 MHz for AMT with a secondary allocation for wireless microphones. This is subject to stringent coordination requirements.

manner that results in a satisfactory degree of worldwide/regional harmonization of spectrum for ENG use in terms of the frequency bands and tuning ranges<sup>3</sup>;

2 that methods should be identified for the possible harmonization of frequency bands and tuning ranges for ENG usage,

*invites ITU-R*

1 to carry out studies of ENG regarding possible solutions for global/regional harmonization in frequency bands and tuning ranges, taking into account:

- propagation characteristics at various frequencies;
- available technologies to maximize efficient and flexible use of frequency;
- system characteristics and operational practices which facilitate the implementation of these solutions;

2 to include in the studies referred to above, sharing and compatibility issues with services already having allocations in frequency bands and tuning ranges which have potential for ENG use;

3 to propose operational measures to facilitate operation of ENG equipment consistent with global circulation of radiocommunication equipment, taking into account Recommendation ITU-R M.1637;

4 to report the results of those studies to the World Radiocommunication Conference 2023 and identify ranges for regional and global harmonization,

*invites administrations*

to participate in the studies by submitting contributions to ITU-R.

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<sup>3</sup> The term “tuning range” for ENG means a range of frequencies over which radio equipment is envisaged to be capable of operating; within this tuning range, the use in any one country of radio equipment from another country will be limited to the range of frequencies identified nationally in that one country for ENG, and will be operated in accordance with the related national conditions and requirements.

**ATTACHMENT**

**PROPOSAL FOR ADDITIONAL AGENDA ITEM TO IDENTIFY AND HARMONIZE  
FREQUENCY BANDS FOR ENG**

**Subject:** Proposed Future WRC Agenda Item for WRC-2023 studying harmonization

**Origin:** United States of America

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*Proposal: To review the frequency bands permitted for ENG, identify alternate bands outside of the 600 MHz and 700 MHz bands, and harmonize them among various administrations.*

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***Background/reason:***

Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands suitable for ENG above 150 MHz and below 2 000 MHz.

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***Radiocommunication services concerned:*** Terrestrial Broadcast, Mobile Service

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***Indication of possible difficulties:*** None foreseen

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***Previous/ongoing studies on the issue:*** Resolution ITU-R 59-1, Report ITU-R BT 2069-7, Report ITU-R BT 2344-2, Recommendation ITU-R BT 1871-2

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<b><i>Studies to be carried out by:</i></b> SG6	<b><i>with the participation of:</i></b> SG5
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***ITU-R Study Groups concerned:*** SG6, SG5

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***ITU resource implications, including financial implications (refer to CV126):*** **Minimal**

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<b><i>Common regional proposal:</i></b> Yes/No	<b><i>Multicountry proposal:</i></b> Yes/No
<b><i>Number of countries:</i></b>	

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***Remarks***

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+1 860-848-3132]